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ABSTRACT

This study attempted to determine whether better predictions of school-level achievement scores than have been reported for big city school districts could be attained by determining whether concentrations of poverty and related social characteristics are related to achievement in such a way as to make it possible to identify specific threshold points below which urban schools are not functioning effectively. Data on school-level reading achievement were obtained from five big city school districts: Chicago, Illinois; Cleveland and Cincinnati, Ohio; and Kansas City and St. Louis, Missouri. For each city, data were obtained and coded for all elementary schools which included at least grades three through six and which reported achievement scores for most of the years included in the data set available in that city. Major findings were: (1) reading levels for elementary schools in the cities included in the sample are highly predictable based on knowledge of neighborhood characteristics excluding measures of race and ethnicity, (2) in general, the best predictor variables for a given city are relatively stable from year to year and across achievement measures, (3) neighborhood characteristics which best account for achievement differences among the schools in this study denote differing aspects of social status and urban organization, and (4) relationships found between neighborhood predictors and elementary school achievement indicate that concentrations of poverty and related characteristics such as high family disorganization and high population density are associated with low achievement in the public schools. (Author/AM)

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CONCENTRATED POVERTY AND READING ACHIEVEMENT IN FIVE BIG CITIES

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The relationship between family background and student achievement has been confirmed by many authors (e.g. Coleman, et al., 1966; Blau and Duncan, 1967; Mosteller and Moynihan, 1972; Jencks, et al., 1972). Lower socio-economic status is systematically related to lower achievement. Typically, researchers who have examined relationships between community social status characteristics on the one hand and school-level academic achievement scores on the other hand have reported squared multiple correlations ranging from .5 to .85 (Hogan:1970).

Although the interrelationships between differing measures of family socioeconomic status are unclear (Hanushek, 1972; Tabler, et al., 1968; Deutsch and Brown, 1964), it is known that family instability associated with low income is related to school achievement, delinquency (Fleisher, 1966) and other social problems which Moynihan (U. S. Department of Labor, 1966) has termed the "tangle of pathology." Given the evidence of a relationship between poverty, family characteristics, and school achievement, this study explores the possibility that it is not solely poverty and/or family disorganization which in themselves are associated with such problems, but rather the high concentration of poor, unstable families which is associated with urban pathology.

Previous studies have provided fragmentary evidence to support the notion that there may be "threshold" points beyond which the school or other institutions tend to be ineffective in the face of a particularly high incidence of problems. Dailey (1966), for example, found that juvenile delinquency rates accelerated noticeably among students in Washington, D. C. Schools in which 90 percent or more of the fourth graders were below national norms in reading. Hanushek (1972) reported that

the percentage of the student body who were black had to be over 75 percent before white achievement was affected and over 45 percent before black achievement was affected. An earlier pilot study we conducted using a sample of Chicago schools identified definite "threshold points" on urban social structure measures beyond which school achievement tended to be uniformly low (Levine, et al., 1974). These findings suggest that concentrations of urban poverty and related social characteristics may become problematic particularly when they pass a relatively specific threshold point beyond which social institutions such as public schools do not function very successfully in ar urban setting.

In addition, identification of threshold points beyond which the schools or other social institutions do not function effectively should help to improve the accuracy of predictions of institutional outputs based on information about the neighborhoods in which they are located. The existence of threshold points, if verified, in effect means that the relationship between neighborhood characteristics and institutional outputs is curvilinear: once the threshold point is reached, outputs are uniformly low and a linear relationship no longer exists between neighborhood social status and output. Appropriate statistical transformations which take curvilinearity into account therefore should allow for improvements in predicting institutional output in multiple regression analysis.

In view of these considerations, the major purposes of the present study were to: 1) determine whether better predictions of school-level achievement scores than heretofore have been reported for big city school districts could be attained by 2) determining whether concentrations of poverty and related social characteristics are related to

achievement in such a way as to make it possible to 3) identify specific threshold points below which urban schools are not functioning effectively.

METHODOLOGY

Data on school-level reading achievement were obtained from central office personnel in five big city school districts: Chicago, Illinois; Cleveland, Ohio; Cincinnati, Ohio; Kansas City, Missouri; and St. Louis, Missouri. Data and conclusions presented in this report are based on analysis in all five cities.

For each city, data were obtained and coded for all elementary schools which included at least grades three through six and which reported achievement scores for most of the years included in the data set available for that city. In each case we were able to obtain appropriate data for at least grades three and six for at least two academic years during or after 1970.

In general, there were few "regular" elementary schools (i.e. schools not devoted substantially to special purposes such as the education of handicapped children) for which data were missing; thus the sample of big city schools utilized in this study includes most of the regular public elementary schools in the five school districts listed above.

Census data for each city in the study were taken from the fourth count of the 1970 Census. Table 1 contains a list of the 39 variables which were selected as basic census predictors for the study and were tabulated for elementary school neighborhoods in each of the five city school districts. Other 1970 census tract data not available in the books published by the Census Bureau were obtained for Cleveland and Kansas City through the assistance of the National Institute of Mental Health and

cooperating state agencies in Kansas, Missouri, and Ohio, which in turn had extracted the data from Census Bureau computer tapes. Variable titles printed with capital letter leads later in this report provide a full description of the variable; those printed in lower case are abbreviated titles (Table 1).

Table 1 about here.

Additional neighborhood data for the study also were obtained from city planning agencies in Cincinnati, Cleveland, Kansas City, and St. Louis. For Cleveland, Kansas City, and St. Louis, these data included land use information which allowed us to construct such variables as population size and housing vacancies per acre of residential land. For Cincinnati, these data constituted a compilation of census tract information from a number of diverse agencies. For Kansas City and Cincinnati, the data obtained from the City Development Department included information collected after the 1970 Census. Tract data obtained from these various sources turned out to be very valuable and more than justified the extra effort and time which were expended in incorporating them in the basic data set and completing the study.

The final type of data on elementary school neighborhoods included in the study consisted of school-level information on student socioeconomic background obtained from school district offices in Chicago, Cincinnati, Kansas City, and St. Louis. Since the large majority of students in all five districts included in the study attend schools near their homes, we believe that it is justified to use this type of data, in conjunction with other types of information as one measure of the characteristics of neighborhoods from which the schools draw their population.

For Chicago and Kansas City, census tract maps and elementary school boundary maps were visually inspected in order to align tracts with schools. For Cincinnati and Cleveland, tract designations for

Table 1,

Selected 1970 Census Variables Included in the Study

Full Description	Abbreviated Description
1. Percent of Occupied Housing Units with Six or More Persons.	Six persons or more.
2. Percent of Occupied Housing Units with 1.51 or More Persons per Room.	People per room.
3. Percent of Families Less than .50 of Poverty Level.	Families below half the poverty level.
4. Percent of Families Above Three Times Poverty Level.	Triple low income level.
5. Percent of Year-round Housing Units Lacking Plumbing.	Housing lacking plumbing.
6. Percent of Year-round Owner-occupied Housing Units Lacking Plumbing.	Owner housing lacking plumbing.
7. Percent of Year-round Renter-occupied Housing Units Lacking Plumbing.	Renter housing lacking plumbing.
8. Percent of Year-round Housing Units Vacant.	Housing units vacant.
9. Percent of Year-round Housing Units Owner-occupied.	Percent owner occupied.
10. Weighted median value of owner occupied housing units.	Median value owner housing.
11. Weighted median value of renter occupied housing units.	Median value renter housing.
12. Percent of Persons 25 and Over High School Graduates.	Percent high school graduates.
13. Percent of Persons 25 and Over One Year or More College.	Percent one year college.
14. Percent of Elementary and Secondary Students in Public Schools.	Percent in public schools.
15. Percent of Families with Female Head.	Percent female head.
16. Percent of Families with Female Head and Children Under 18.	Percent female head w. children.
17. Percent of Total Employed Persons 16 Years of Age and Over Classified as Professional Occupations.	Percent professional.
18. Percent of Total Employed Persons 16 Years of Age and Over Classified as Laborers, Service Workers and Related Categories.	Percent laborers.
19. Percent of Total Employed Persons 16 Years of Age and Over Classified as Sales Workers.	Percent sales workers.
20. Percent of Total Employed Persons 16 years of Age and Over Classified as Laborers or Craftsmen.	Percent laborers or craftsmen.
21. Mean Income per Family.	Mean Income
22. Mean Number of Persons per Household.	People per household.

Table 1 (cont'd.)

	Full Description	Abbreviated Description
23.	Mean Number of Children per Household.	Children per family.
24.	Percent of Females 14 Years of Age and Over Who Are Separated	Females separated.
25.	Percent of Population 15 to 25 Years of Age.	Percent 15-24 years old.
26.	Percent of Males 15 to 25 Years of Age	Percent males 15 to 24 years old.
27.	Percent of Males 15 to 19 Years of Age.	Percent males 15 to 19 years old.
28.	Percent of Males 10 to 19 Years of Age.	Percent males 10 to 19 years old.
29.	Percent of Males 60 Years of Age or Older.	Percent males 60 years old.
30.	Percent of Rental Housing Units $200 or More	Rental units over $200.
31.	Percent of Rental Housing Units $100 or Less.	Rental units under $100.
32.	Percent of Rental Housing Units $80 or Less.	Rental units under $80.
33.	Percent of Owner Occupied Housing Units Over $35,000.	Owner units over $35,000.
34.	Percent of Owner Occupied Housing Units Under $20,000.	Owner units under $20,000.
35.	Percent of Owner Occupied Housing Units Under $15,000.	Owner units under $15,000.
36.	Percent of Households in Present Housing Unit Since 1950.	Percent moved before 1950.
37.	Percent of Households in Present Housing Unit Since 1960.	Percent moved before 1960.
38.	Percent of Households in Present Housing Unit After 1967.	Percent moved after 1967.
39.	Percent of Males 16 Years of Age or More Who Are Unemployed or Not in the Labor Force.	Males unemployed or not in labor force.

elementary schools were obtained from central office personnel. For St. Louis, a combination of these two approaches was used in allocating tracts to schools. In order to enhance the reliability of the data, schools serving tracts with less than 1,000 population were eliminated from the study. Except in the case of Kansas City, however, only a very few schools were taken out for this reason; in Kansas City, twelve of seventy-seven schools were eliminated.

RESULTS

Many of the important findings appeared throughout the analysis for each of the five school districts in the sample, thus making it possible to illustrate them with selected data from a single district. Tables 2 through 7 provide selected data including information on squared multiple correlations (R^2) and beta coefficients for each of the five city school districts in the study. Squared multiple correlations designated for a given dependent variable are for the subset of predictor variables which contributed statistically significant R^2 increases at the .05 level of confidence. Appendix A provides a description of the independent variables which are included in the tables. Major findings illustrated in Tables 2 through 7 are discussed below.

- Tables 2-7 about here -

1. Reading levels for elementary schools in the cities included in the sample are highly predictable based on knowledge of neighborhood characteristics excluding direct measures of race and ethnicity. As shown in Tables 2 through 7, sixth grade R^2's generally fell in the .80's for schools in Cincinnati and Kansas City, and fell in the .60's and .70's for Chicago, Cleveland, and St. Louis.[1] These R^2's are frequently

[1] As shown in Table 6, the accuracy of prediction for 1974-1975 scores in Kansas City dropped off precipitously to a substantively insignificant

substantially higher than those reported in most previous research relating neighborhood characteristics exclusive of race and ethnicity to school-level achievement.

2. In general, the best predictor variables for a given city are relatively stable from year to year and across achievement measures. The variables listed in Tables 2 through 7 were selected after examining numerous regression runs in which they frequently added statistically significant R^2 increases across grade levels, performance levels, and years of testing. Their beta weights also tended to be relatively stable for most of the dependent variables with which they were tested, even though the predictors for each city were highly intercorrelated and many did not enter the final regression equations for all of the dependent variables.[2]

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level. Most likely this happened because the district switched to a "level" testing approach in which teachers administer differing tests within the same grade. For example, rather than giving all sixth graders the "standard" sixth grade test, many students are given less advanced tests because their teachers believe the latter are more suitable to their present level of achievement. While this approach has many advantages, including equity for students and better diagnosis of individual performance, it makes it difficult to compare performance levels across a group of schools. In 1975-1976 the district reverted to "out of level" testing, and the R^2 using the predictors shown in Table S-2 increased to .784 (not shown in the table).

[2]Both these considerations--i.e. intercorrelation among the predictors and the mixture of variables in an equation--can have an important effect on the calculation of beta weights.

TABLE 2

Variables Predicting Sixth Grade Reading Comprehension Levels
(Q2 Grade Equivalent Scores),
Chicago Elementary Schools, 1969-1974

Predictor Variable*	Beta Coefficients for Variables Entering Best Stepwise Equations in Specified Years**				
	1969-1970	1970-1971	1971-1972	1972-1973	1973-1974
1. Triple low income level (sq.)	.176	.250	.277		
2. Percent females separated (l)	-.189	-.268			
3. Percent high school graduates	.230				.113
4. Owner units under $20,000 (l)		-.166	-.145	-.221	-.123
5. Percent AFDC, 1974 (sqt)	-.414	-.284	-.530	-.668	-.742
Squared Multiple Correlation	.777	.773	.770	.764	.782
Number of schools	(275)	(275)	(275)	(275)	(275)

*Unless otherwise designated, predictor variables are constructed from 1970 data. Letters in parentheses represent variables transformed as follows: l - log; 4 - reciprocal; sq = square; sqt = square root.

**Numbers in the table show the standardized beta coefficients for variables which entered equations at a significant level based on increase in the squared multiple correlations in the years specified. The squared multiple correlations (R^2) shown are adjusted for sample size. Only coefficients above .10 are included.

TABLE 3

Variables Predicting Third Grade Reading Comprehension Levels
(Q2 Percentile Scores),
Cincinnati Elementary Schools, 1970 to 1973

Predictor Variable*	Beta Coefficients for Variables Entering Best Stepwise Equations in Specified Years**		
	1970-1971	1971-1972	1972-1973
1. Percent moved before 1960	.122		
2. Percent laborers or craftsmen (r)	-.186		-.277
3. Percent heads of households who are service operators or unskilled workers, 1975 (l)	-.305	-.364	
4. Percent vacant housing units, 1972 (r)	.302	-.194	
5. Percent families under $2,000 (r)	-.216	-.252	-.245
6. People per room (l)		-.196	-.450
7. Percent adults with 4 years college		.254	
Squared Multiple Correlation	.714	.798	.751
Number of schools	(69)	(69)	(69)

*Unless otherwise designated, predictor variables are constructed from 1970 data. Letters in parentheses represent variables transformed as follows: l = log; r = reciprocal; sq = square; sqt = square root.

**Numbers in the table show the standardized beta coefficients for variables which entered equations at a significant level based on increase in the squared multiple correlations in the years specified. The squared multiple correlations (R^2) shown are adjusted for sample size. Only coefficients above .10 are included.

TABLE 4

Variables Predicting Sixth Grade Reading Comprehension Levels
(Q2 Percentile Scores),
Cincinnati Elementary Schools, 1970 to 1975

Predictor Variable*	Beta Coefficients for Variables Entering Best Stepwise Equations In Specified Years**				
	1970-1971	1971-1972	1972-1973	1973-1974	1974-1975
1. Rental units under $80 (l)				-.191	
2. Percent moved before 1960	.139	.160	.225	.283	.233
3. Percent laborers or craftsmen (r)	-.391	-.264	-.303	-.270	
4. People per room (l)	-.352	-.268	-.366		.228
5. Percent adults with 4 years college		.109			.282
6. Percent sales workers X Triple low income level					.470
7. People per room X Percent laborers or craftsmen	-.154				
8. Percent families under $2,000 (r)	-.434	-.430	-.204	-.319	
Squared Multiple Correlation	.852	.900	.848	.750	.789
Number of schools	(62)	(62)	(62)	(62)	(62)

*Unless otherwise designated, predictor variables are constructed from 1970 data. Letters in parentheses represent variables transformed as follows: l = log; r = reciprocal; sq = square; sqt = square root.

**Numbers in the table show the standardized beta coefficients for variables which entered equations at a significant level based on increase in the squared multiple correlations in the years specified. The squared multiple correlations (R^2) shown are adjusted for sample size. Only coefficients above .10 are included.

TABLE 5

Variables Predicting Median Sixth Grade Reading Comprehension Levels (Designated Percentile Levels), Cleveland Elementary Schools, 1973-1974 and 1974-1975

Predictor Variable*	Beta Coefficients for Variables Entering Best Stepwise Equations at Specified Percentile Levels in Specified Years**							
	PR10*** 1973-74	PR50 1973-74	PR75 1973-74	PR90 1973-74	PR10 1974-75	PR50 1974-75	PR75 1974-75	PR90 1974-75
1. Females separated (rec)		.273	.340	-.459	-.237	-.256	-.314	-.316
2. Owner units under $15,000 (l)	-.177							
3. Percent high school graduates	.131				.322	.144	.237	.169
4. Triple low income level X Percent one year college			.205					
5. Percent of neighborhood children 5-11 years old in welfare families	-.444	-.597	-.404		-.409	-.520	-.386	
6. Percent of neighborhood public school children 5-11 years old in welfare families				-.446				-.325
7. Low income neighborhood by census bureau definition								-.155
Squared Multiple Correlation	.448	.686	.686	.693	.513	.676	.652	.632
Number of Schools	(105)	(105)	(105)	(105)	(105)	(105)	(105)	(105)

*Unless otherwise designated, predictor variables are constructed from 1970 data. Letters in parentheses represent variables transformed as follows: l - log; r = reciprocal; sq = square; sqt- square root; rec = recoded to 0 to 2% = 1 2.1 to 100% = 2.

**Numbers in the table show the standardized beta coefficients for variables which entered equations at a significant level based on increase in the squared multiple correlations in the years specifeed. The squared multiple correlations (R^2) shown are adjusted for sample size. Only coefficients above .10 are included. Dependent variables are as follows: To = Composite Reading; Vocab = Vocabulary; Comp = Comprehension.

***PR10 = 10th percentile scores, i.e. the performance level of the student scoring below 90% of his classmates at a given school; PR50 = 50th percentile scores, etc.

TABLE 6

Variables Predicting Median Sixth Grade Reading Comprehension Levels
(Q2 Grade Equivalent Scores),
Kansas City, Missouri Elementary Schools, 1966 to 1975

Predictor Variable*	Beta Coefficients for Variables Entering Best Stepwise Equations in Specified Years**							
	1366-1967	1967-1968	1968-1969	1969-1970	1970-1971	1971-1972	1972-1973	1974-1975
1. People per room (r)				-.182	-.151	-.175	-.298	
2. Females separated (l)		-.356						
3. Percent in public school	-.164		-.156			-.246	-.182	
4. FHA transactions 1971-1975 (l)			-.196	-.154		-.250	-.214	
5. Percent sales workers X Triple low income level	.740	.584	.700	.443	.333	.178		
6. Percent students subsidized lunch, 1976 (l)				-.329	-.350	-.404	-.474	-.473
7. Triple low income level X Percent one year college	.164	.131		.160	.179			
8. Ratio of poverty families to dwelling units		-.157		-.146				
9. Percent students subsidized lunch X FHA transactions					-.263			
Squared Multiple Correlation	.846	.804	.750	.842	.852	.834	.765	.209
Number of schools	(55)	(55)	(55)	(55)	(55)	(55)	(55)	(55)

*Unless otherwise designated, predictor variables are constructed from 1970 data. Letters in parentheses represent variables transformed as follows: l = log; r = reciprocal; sq= dquare; sqt = square root.

**Numbers in the table show the standardized beta coefficients for variables which entered equations at a significant level based on increase in the squared multiple correlations in the years specified. The squared multiple correlations (R^2) shown are adjusted for sample size. Only coefficients above .10 are included.

TABLE 7

Variables Predicting Median Sixth Grade Reading Achievement Levels
(Q2 Grade Equivalent Scores),
St. Louis Elementary Schools, 1970 to 1975

Predictor Variable*	Beta Coefficients for Variables Entering Best Stepwise Equations in Specified Years**							
	1970-1971 Total	1970-1971 Vocab.	1970-1971 Comp.	1972-1973 Total	1972-1973 Vocab.	1972-1973 Comp.	1974-1975 Total	1974-1975 Vocab.
1. Owner units under $15,000 (r)	-.289	-.307	-.218	-.363	-.360	-.303	-.358	-.336
2. Percent econ. deprived 1974 (sqt)	-.424	-.460	-.591	-.283	-.457	-.584	-.339	-.326
3. Male-female ratio for population 15 to 24 years old	-.341	-.313	-.189	-.168	-.246	-.332	-.151	
4. Families below half the poverty level	-.261	-.237					-.237	-.268
5. Number of separated females per residential acre				-.313				
6. Percent occupied housing units lacking plumbing (l)				-.168	-.306	-.163		
7. Percent of dwelling units vacant (l)					-.240			
8. Percent female head w/children					-.179			
9. Percent one year college			.628					
Squared Multiple Correlation	.680	.723	.567	.835	.779	.811	.660	.609
Number of schools	(65)	(65)	(65)	(65)	(65)	(65)	(65)	(65)

*Unless otherwise designated, predictor variables are constructed from 1970 data. Letters in parentheses represent variables transformed as follows: l = log; r = reciprocal; sq = square; sqt = square root.

**Numbers in the table show the standardized beta coefficients for variables which entered equations at a significant level based on increase in the squared multiple correlations in the years specified. The squared multiple correlations (R^2) shown are adjusted for sample size. Only coefficients above .10 are included. Dependent variables are as follows: Total = Composite Reading; Vocab = Vocabulary; Comp = Comprehension.

In the Cincinnati data, for example, the variable Percent moved before 1960 entered six of the eight regression runs reported in Tables 3 and 4, in each case with beta weights ranging only from .122 to .283.[3] For Kansas City, similarly, Percent students subsidized lunch entered five of the eight regression equations reported in Table 6, in each case with a beta weight between -.329 and -.474. These results further support the conclusion that a carefully selected set of neighborhood predictors can be efficacious in accounting for achievement differences among schools in a big city using a variety of achievement data collected over a substantial span of time.

3. Within these generally stable patterns, a few trends can be noted involving changes in the predictability of achievement scores across grade levels, performance levels, and years of testing. Probably the most important of these trends involves an apparent falling off of the potency of a few of the census data in predicting achievement several years after they were collected in 1970. Regarding sixth grade scores for St. Louis, for example, the beta weights for Male-female ratio for population 15 to 24 years old decrease from -.341 in 1970-1971 to -.151 in 1974-1975. In the data for Kansas City, similarly, the beta weights for Percent sales workers X triple low income level decrease from .443 in 1969-1970 to .178 in 1971-1972. The

[3] It should be noted that the directions of the beta weights for most of the variables shown in Tables 2 through 7 are compatible with the hypothesis that poverty, social disorganization, and related characteristics such as deteriorated housing, high population density, high crime rates, and low occupational levels are associated with low achievement in the schools. A few variables, such as Percent vacant housing units, 1972 in the regression run for 1970-1971 third grade scores in Cincinnati (Table 3), enter in a direction opposite to this hypothesis, but in each of these cases the simple correlation between the variable and school achievement is in the expected direction. In addition, each of the variables in question also is very highly correlated at .8 or more with another independent variable, thus making it difficult for the computer regression program to estimate their effects simultaneously. In other words, the few beta signs in Tables 2 through 7 which appear contrary to expectations probably are due to high intercorrelation (multicollinearity) among the predictors.

overall trend does not appear consistently in Tables 2 through 7, but it was more evident in other regression runs using differing dependent variables than in the regressions reported in the six tables.

Concomitantly, variables based on data collected after 1970 begin, where available, to enter the equations at a more significant level toward the middle of the decade than in the academic years clustered around 1970. This trend is apparent, for example, in the data on sixth grade scores in Kansas City, where the betas for Percent students subsidized lunch, 1976 increased from insignificant levels in 1966-1967 to -.474 in 1972-1973. It may account in part for decreases which occur in the betas for 1970 census variables,[4] but we also found that the R^2's for years after 1970-1971 tended to be much lower than shown in Tables 3, 4, 6, and 7 until post-1970 data were included in the regression runs, thus suggesting the utility of such data in accounting for achievement differences after 1970-1971.

Other trends discernible in the analysis indicated that R^2's tended 1) to be clearly higher for sixth grade data than for third or fourth grade data (cf. Tables 3 and 4); 2) to be higher for higher performance levels such as the 50th and 75th percentiles than for lower performance levels such as the 10th or 25th percentiles (Table 5); and 3) to be about as high for reading sub-test scores (i.e. vocabulary, comprehension) as for total reading scores (Table 7).

The latter finding undoubtedly is due to the fact that the subtests we used in the analysis were very highly correlated at .9 or above with

[4] When predictors are intercorrelated, increase in the potency of one variable often reduces the beta weights of the others.

each other and with total reading scores. The finding regarding performance levels may indicate that students with reading scores in the bottom range tend to more frequently guess and/or respond carelessly on tests than do higher achieving students. The finding regarding grade level differences may be due to such considerations as a lower absolute standard deviation (i.e. smaller range) in the lower grades than the higher grades, or to improvements in compensatory education which may have reduced the relationships between neighborhood environment and achievement for lower grade students but not yet had this effect for higher grade students.

4. Neighborhood characteristics which best account for achievement differences among the schools in this study denote differing aspects of social status and urban organization. Examination of Tables 2 through 7 indicates that the best neighborhood predictor variables measure a variety of aspects of social status and urban organization. For 1970-1971 scores in Chicago, for example, the best predictor variables include a measure of family organization (Females separated, beta =-.268[5]) and a measure of housing (Owner units under $20,000). For 1972-1973 sixth grade scores in Cincinnati, the best predictors include measures of occupation (Percent laborers or craftsmen), mobility (Percent moved before 1960); and income (Percent families under $2,000). For 1973-1974 10th percentile scores in Cleveland, the best predictors respectively denote family organization (Females separated), education (Percent high school graduates), and housing (Owner units under $15,000). The best predictors for Kansas City scores in 1968-1969 denote housing (FHA transactions), public service utilization (Percent in public school), and density (People per room), while the best predictors for 1974-1975 total

[5]This means that achievement scores decreased .268 of one standard unit for every standard unit increase in Percent females separated after effects of the other variables shown in column 3 of Table 2 were statistically controlled.

reading scores for St. Louis include measures of income (Families below half the poverty level), sex distribution (Male-female ratio), and housing deterioration (Percent of dwelling units vacant).

The fact that so many types of variables are useful in maximizing prediction within and across the cities included in the sample suggests that they are reflecting differing aspects of a complex situation involving disorganization in big city social systems. Most of the predictor variables in this study are substantially correlated with one another: deteriorated housing is associated with low income which in turn is associated with low occupational level and family disorganization, and so on. Low school achievement is but one manifestation of disorganized and deteriorated social and physical conditions which exist in neighborhoods which might be termed "inner city" in that they tend to be clustered in the inner core parts of large metropolitan areas. Such neighborhoods frequently are termed "poverty areas" or "slums," and are characterized by a multitude of problems including poor health conditions, high crime rates, dilapidated housing, and high density. Living in a poverty area apparently has multiple disadvantages in the sense that each of the predictors listed in Tables 2 through 7 as well as others not shown in these tables may reflect related aspects of urban social organization which should be taken into account as a totality in trying to understand the problems and improve conditions

which exist in big city institutions such as schools and hospitals.

Examining this situation from the viewpoint of children who grow up and attend school in inner-city neighborhoods, one can say that youngsters in inner city schools suffer multiple educational disadvantages associated not just with the low income level of their families but also with poor housing conditions, high crime rates, and other problems in their neighborhoods.

5. Relationships found between neighborhood predictors and elementary school achievement in all five cities indicate that concentrations of poverty and related characteristics such as high family disorganization and high population density are associated with low achievement in the public schools. Years of research have shown that poverty and related characteristics are highly related to school achievement, i.e. the higher the percent of students in poverty, the lower their average achievement. For this reason, we expected to find a clear relationship between poverty and reading achievement. To a remarkable extent, however, we found that indicators of poverty and related characteristics consistently show a curvilinear relationship[6] with achievement such that schools serving neighborhoods with high concentrations of poverty characteristics almost universally have low average achievement scores on standardized reading tests administered in all five cities included in the

[6] In order to take account of curvilinear relationships, many of the predictor variables were mathematically transformed using logged scores, reciprocals, squares, and other transformations. Such transformations enable a researcher to determine the maximum correlation between an independent and a dependent variable. A legend showing the transformations which were used is shown in Tables 2 through 7.

study.[7] For many of these variables, moreover, points were clearly discernible above or below which achievement scores were consistently low regardless of the type of achievement data analyzed or the year in which they were collected. These results indicate that few if any big city schools in our sample are functioning successfully to raise reading achievement to average (i.e. national) levels of expectation if a substantial number of their students live in neighborhoods characterized by high rates of poverty and related characteristics such as family disorganization and crime. Examples of this phenomena can be seen in each of the five cities under examination. In each city, for example, schools located in neighborhoods in which roughly 3.5 to 5% or more of the female population over 14 years old was separated in 1970 almost never scored in the top 60% of schools in that city on sixth grade reading achievement.

Somewhat similar results were obtained with respect to several other variables denoting high concentrations of poverty and related characteristics of social disorganization. For example, schools in all five cities seldom if ever scored in the upper portion of the achievement distribution for the school district in question if between four and seven percent (depending on the city) of the families in school neighborhoods were

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[7] Reading tests for which data were made available and used in the present study were as follows:

Chicago: 1969-1972 - Metropolitan Achievement Test; 1973 and 1974 - Iowa Test of Basic Skills.
Cincinnati: Metropolitan Intermediate Achievement Test.
Cleveland: Comprehensive Test of Basic Skills.
Kansas City: Iowa Test of Basic Skills.
St. Louis: Iowa Test of Basic Skills.

classified in the 1970 census as Families Less Than .50 of Poverty Level. Somewhat similar results were found for Percent of Occupied Housing Units with 1.51 or more Persons Per Room, though the breaking point on this variable appeared to be more spread out from city to city, ranging roughly from three to eight percent.

This finding can be turned around and stated in another way: once measures of concentrated urban poverty in school neighborhoods reach a threshold point for a given city, academic achievement scores almost always fall in the bottom half for schools in the city even though average achievement scores in big cities generally tend to be low in the first place.

It might be thought that curvilinearity in our data reflects as much a tendency for schools in neighborhoods with unusually high concentrations of wealth and related characteristics to score unusually high in achievement as for schools with high concentrations of poverty to score unusually low. This did not appear to be the case, however. For example, examination of the relationship between the variable Percent of Families Above Three Times Poverty Level and achievement level did not reveal consistent curvilinear relationships. The general lack of curvilinearity in these and other plots using variables denoting unusually high concentrations of wealth suggests that it is the concentration of poverty rather than the existence or non-existence of homogeneous high status neighborhoods that is more directly related to the generally low achievement level typically found in big city school districts.

6. Some independent variables tended to be very powerful predictors of achievement and/or to show strong curvilinearity with achievement in

some cities but not in others. The variable Percent of Total Employed Persons 16 Years of Age and Over Classified as Laborers and Craftsmen, for example, generally correlated (after transformation to its reciprocal) in the .70's in the Cincinnati analysis but only in the .50's and .60's in the Chicago analysis. Similarly, the log of Females separated generally correlated in the .70's and .80's in Chicago analyses but seldom correlated above .70 in the Cleveland analysis. Differences of this sort may be related to differences in the degree to which various cities resemble each other with respect to the range and level of phenomena described by such variables.

These results also suggest that differences among cities in characteristics regarding the distribution and/or concentration of phenomena such as the percentage of females who are separated, the percentage of families which are far above the poverty level, the percentage of workers who are laborers or craftsmen, and other indicators of urban social structure affect the functioning of major social institutions such as the school and the law enforcement system. For example, additional research might show that the concentration of poverty-level families is more closely related to school achievement and crime in cities having a high population density than in cities with a low density. Other characteristics such as high degree of housing deterioration, availability and utilization of non-public schools, and high population mobility within the city may moderate relationships between concentrated poverty and major urban social institutions such as the school. Comparative studies of such differences using the type of data and

analysis described in this paper should receive high priority in research on urban affairs.

7. Indications were found that the relatively low R^2's found for Chicago and Cleveland as compared with Cincinnati and Kansas City may have been due to greater problems and inaccuracies in matching census tracts to schools in the former two cities than in the latter two. Both Chicago and Cleveland are old cities which have many small census tracts that are relatively high in population density and have elementary schools relatively close to one another.[8] In allocating census tracts to schools for Chicago, we were dependent on maps of census tracts and schools which were particularly difficult to align due to the small size of many of the units on each one. To allocate census tracts to schools for Cleveland, a list of tracts for each school was obtained from central office personnel, but more than in any other city the tracts were fragmented between schools and a number of schools on this list had only fractions of tracts (i.e. half or less) assigned to them. Fifteen of the 110 Cleveland elementary schools in our sample were in this category, that is they did not have more than half of any single census tract assigned to them.

To explore the question of whether these difficulties in matching census tracts with schools in Chicago and Cincinnati might be affecting the accuracy of our predictions in these two cities, a supplemental

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[8] This pattern probably is more characteristic of Chicago and Cleveland than of Cincinnati, Kansas City, and St. Louis. Unfortunately we do not have sufficient comparable data across all five cities to validate such a generalization.

analysis was conducted 1) limiting the regression runs in both cities to schools which had at least 5000 total population in the census tracts we had assigned to schools;[9] and 2) eliminating the fifteen Cleveland schools with questionable census tract designations.

These supplemental analyses frequently raised sixth grade R^2's near to or over .80, thus suggesting that the accuracy of predictions for these two cities might have been substantially higher had we been able to obtain a better match between census tracts and schools. This possibility should be explored more systematically in further research, particularly with the informed knowledge and help of local public school officials in big city districts in which there may be unusual difficulty allocating tracts to schools.[10]

8. Our data do not make it possible to determine whether race is associated with achievement among the cities in our sample independent of the association between concentrated poverty and low achievement. The data described above indicated that concentrated poverty and related social characteristics such as family disorganization are associated with uniformly low achievement levels in the schools, and that one need not know anything about the racial composition of big city neighborhoods in order to accurately predict achievement levels in their public schools. When neighborhood

[9] This exploration was carried out based on the presumption that schools which had a relatively large population base assigned to them might be more likely to accurately reflect neighborhood characteristics in their student body than schools with a relatively small population base.

[10] Another possible reason why R^2's in Chicago and Cleveland were less than in other cities is because for Chicago, we were not able to obtain as much non-census neighborhood data as for the other cities and for Cleveland, non-census data obtained were viewed as somewhat inadequate by personnel in the agency which collected them. Other possible reasons involve differences among the five districts in testing approaches, data reporting procedures, and related practices.

racial-composition variables such as percent of population black were entered in the regression equations following the best neighborhood predictors shown in Tables 207, they seldom added more than one point to the R^2's in any of the five big cities in the study.

However, as might have been predicted given the fact that discrimination in housing, employment, and other areas has made it more difficult for minority families than majority white families to move out of low-income neighborhoods, concentrated poverty neighborhoods in the cities in our sample are heavily minority in racial composition. High intercorrelations between percent black and measures of concentrated poverty made it impossible to determine whether race is independently associated with low achievement levels among the big city schools in our sample.

DISCUSSION AND CONCLUSIONS

Probably the most important of our findings involves our identification of specific breaking-points or "thresholds" beyond which achievement levels in big city elementary schools are uniformly very low, combined with the finding that differing indicators such as high family disorganization, high housing deterioration, low income, low educational level, high mobility, high crime rate, and high density all contribute to the prediction of achievement. Our results in this regard were highly consistent, regardless of the nature of the independent and dependent variables used in the analysis and the school district for which the analysis was being conducted. For example, in all five big city school districts included in the study, achievement levels were consistently low in neighborhoods in which 3.5 to 5% of the adult females were classified as separated in the 1970 census or four-to-seven percent of the families were half the poverty level or below.

In effect, what the methodology employed in this study accomplished in addition to identifying the best neighborhood predictors of school-level reading achievement was to identify "inner city" neighborhoods which are characterized by multiple, interrelated problems including concentrated poverty, high family and social disorganization, and undeveloped human and physical resources measured by variables such as education level of the population and value or condition of the housing stock. These are the parts of the metropolitan area to which poor and problem-ridden families and individuals have been consigned in unusally-heavy concentrations by forces which have been responsible for the evolution of large metropolitan areas in the United States. Low school achievement

is but one manifestation of a larger syndrome of urban decay and deterioration involving the establishment and maintenance of concentrated poverty areas within big cities. Children growing up in concentrated poverty neighborhoods in big cities apparently are educationally disadvantaged in a number of ways only partly measured by the low income level of their families.

Perhaps it is to be expected that the public schools and other social institutions in inner city areas are not functioning very successfully in the face of multiple problems which combine to limit their effectiveness. It is very difficult, for example, for teachers to work successfully with large concentrations of low status children or for social welfare workers to work effectively with high caseloads of extremely poor families. Based on our data one can only speculate on the reasons why the public schools or other urban social institutions apparently are so unsuccessful in providing education and other important services but we believe that the basic reason has to do with an "overload" in these institutions which hampers effective administration and operation. That is, once the problems characteristic of inner city neighborhoods reach certain threshold points in severity and frequency, the institution tends to operate ineffectively and/or dysfunctionally.

In the case of the public schools, for example, elementary teachers typically have two, three, or four problem pupils who have poor academic skills and need special help to improve their achievement; most teachers find ways to provide this help and still work productively with other students in the class. In an inner city classroom, by way of contrast, for various reasons six or eight students may need special help but schools have not been organized to provide special help to this high a

percentage of pupils; partly as a result the teacher either may neglect much of the class to provide special help to problem pupils, or pupils with special problems may not be helped very much and then will tend to create even more difficult behavioral and learning problems as they proceed through school. Similarly for administrators, counselors, and other school staff, increasing the number of problems to be dealt with may cause a "spreading thin" of professional resources such that few of the problems are dealt with successfully; as a result, the problems feed on themselves in the future. Doubling the number of problems in a school, in other words, may triple or quadruple the difficulty of dealing with them successfully, and may easily result in dysfunction throughout the institution.

Other social institutions in the inner city face comparable difficulties in handling the multiple problems characteristic of concentrated poverty areas. As regards the health system, for example, logic suggests that it is many times more difficult to deliver public health services effectively to populations which have few economic resources and are densely concentrated than to wealthy populations spread out in such a way as to lessen the communicability of disease and infection. As regards the law enforcement system, police and other personnel faced with a particularly high incidence of crimes have less time to deal effectively with any given offense; partly as a result their morale tends to deteriorate, offenders tend to be apprehended and punished relatively less often than in low crime areas, young people see evidence that crime and punishment are seldom related in real life, and before long conditions become favorable to the spread of contagious social behaviors fully as destructive as the most virulent physical epidemic.

Institutions concerned with maintenance of the physical environment are similarly impacted by conditions in the inner city. Savings and loan associations, for example, may be unable to make a profit when the default rate on home loans doubles from two or three percent to five or six percent; one result is that residents of the inner city are unable to obtain loans to maintain or improve their property, except, perhaps, at exorbitant interest rates which lead to still more defaults. Once a few properties on an inner city block become deteriorated and unsalable, property values nearby go down and lending institutions become still more reluctant to approve loans. Before long, a threshold point has been reached beyond which occurs a spiralling cycle of further deterioration and deflation in the capital stock of the neighborhood.

These examples are admittedly simplistic in that they do not take into account all the causes and problems involved in the dysfunction of social institutions in concentrated poverty neighborhoods. In particular, a full analysis of institutional dysfunctioning in the inner city also should consider the interrelationships between differing institutions and urban systems, as when abandoned housing provides a breeding ground for delinquency among teenagers or when students who can barely read drop out of school and begin looking for work which requires a higher level of literacy. Inner city schools, for their part, are faced with the problem of teaching large numbers of students whose main concern frequently is that of survival in the neighborhood outside the school, because housing, health, law enforcement, welfare, and other institutions also are not functioning successfully in the inner city. Overloaded with too many students who themselves are overloaded with a multitude of individual

and family problems, the public schools as traditionally organized and operated sometimes then may all but cease functioning educationally at all, becoming little more than custodial institutions in which students and teachers expect little and achieve less.

An additional point which should be emphasized here involves our finding that the variable Percent females separated is one of the best neighborhood predictors of achievement in big city schools. This variable--and related measures such as the percentage of female-headed families, the percentage of males separated, or the percentage of husband-wife families--is a primary characteristic of concentrated poverty neighborhoods and a direct reflection of the widespread social disorganization which exists in the inner city. From this point of view it is not surprising to find that a high percentage of separated females--or separated males, for that matter--is very closely associated with low achievement levels in the public schools: a high percentage of separated females represents the dysfunctioning of the family as an institution under inner city conditions, just as low achievement represents the dysfunctioning of the schools. A relationship between female-headed families on the one hand and low school achievement or alternate indices of institutional failure on the other does not in itself indicate that female-headed families are somehow "inferior." As pointed out by Robert B. Hill (1971:E8985) of the National Urban League, such statistics do not necessarily support "the view of the Negro family as a causal nexus in a tangle of pathology which feeds on itself. Rather, we view the Negro family in theoretical perspective as a subsystem of the larger society."

A statistical study such as our own, which is based on geographic aggregates, can indicate that students achieve poorly in neighborhoods

with a high incidence of poverty and social disorganization; it does not show that students in female-headed families in these neighborhoods achieve better or worse than those from intact nuclear families. The results can be interpreted as easily and validly to suggest that many youngsters suffer educational disadvantages associated with environmental conditions in neighborhoods with high proportions of female-headed families as to indicate that female-headed families somehow "cause" low achievement. Unless urban policies in the future deal directly with the neighborhood-level aspects of educational and other problems which are overloading major social institutions in big cities, they are likely to prove as discouragingly unsuccessful as have most previous major government experiments in educational and social reform.

APPENDIX A

Description and Source of Neighborhood Predictor Variables Used in Final Regression Analysis Shown in Tables 2-7*

	Description	Source
	CHICAGO	
1.	Percent of Families Above Three Times Poverty Level	1970 Census Book
2.	Percent of Females 14 Years of Age and Over Who Are Separated	"
3.	Percent of Persons 25 and Over High School Graduates	"
4.	Percent of Owner Occupied Housing Units Under $20,000	"
5.	Percent of School-aged Children in Families Receiving Aid to Families With Dependent Children (AFDC), 1974	Board of Education
	CINCINNATI	
1.	Percent of Households in Present Housing Unit Since 1960	1970 Census Book
2.	Percent of Total Employed Persons 16 Years of Age and Over Classified as Laborers and Craftsmen	"
3.	Percent of Occupied Housing Units with 1.51 or More Persons per Room	"
4.	Percent of Rental Housing Units $80 or Less	"
5.	Percent of Families Above Three Times Poverty Level	"
6.	Percent of Total Employed Persons 16 Years of Age and Over Classified as Sales Workers	City Planning Dept.
7.	Percent Heads of Households Who are Service Operators or Unskilled Workers, 1970	"
8.	Percent Vacant Housing Units, 1972	"
9.	Percent of Adult Population with 4 Years or More College	"
10.	Percent of Families with Annual Income Under $2,000	"

*Unless otherwise indicated, data are for 1970.

Appendix A (continued)

	CLEVELAND	
1.	Percent of Families Above Three Times Poverty Level	1970 Census Book
2.	Percent of Owner Occupied Housing Units Under $15,000	"
3.	Percent of Persons 25 and Over One Year or More College	"
4.	Percent of Persons 25 and Over High School Graduates	"
5.	Percent of Females 14 Years of Age and Over Who Are Separated	"
6.	Low Income Neighborhood by Census Bureau Definition	U. S. Census Bureau
7.	Percent of Neighborhood Children 5-11 Years Old in Welfare Families, 1975	City Planning Dept.
8.	Percent of Neighborhood Public School Children 5-11 Years Old in Welfare Families, 1975	"
	KANSAS CITY	
1.	Percent of Occupied Housing Units with 1.51 or More Persons per Room	1970 Census Book
2.	Percent of Total Employed Persons 16 Years of Age and Over Classified as Sales Workers	"
3.	Percent of Elementary and Secondary Students in Public Schools	"
4.	Percent of Females 14 Years of Age and Over Who Are Separated	"
5.	Percent of Families Above Three Times Poverty Level	"
6.	Percent of Persons 25 and Over One Year or More College	"
7.	Number of Poverty Families	"
8.	Percent of Total Employed Persons 16 Years of Age and Over Classified as Sales Workers	"
9.	Number of Dwelling Units	Regional Planning Commission
10.	Percent of Housing Units FHA Foreclosures, 1971-1975	City Development Department
11.	Percent Students Eligible for Subsidized Lunch, 1976	Board of Education

Appendix A (continued)

	ST. LOUIS	
1.	Percent of Owner Occupied Housing Units Under $15,000	1970 Census Book
2.	Ratio of Males to Females for Population 15 to 24 Years Old	"
3.	Percent of Year-Round Owner-Occupied Housing Units Lacking Plumbing	"
4.	Percent of Families Less than .50 of Poverty Level	"
5.	Percent of Females 14 Years of Age and Over Who Are Separated	"
6.	Percent of Persons 25 and Over One Year or More College	"
7.	Percent of Families with Female Head and Children Under 18	"
8.	Number of Dwelling Units	City Planning Department
9.	Number of Vacant Dwelling Units	"
10.	Number of Residential Acres	"
11.	Percent of Economically Deprived Students (in Families Receiving AFDC), 1974	Board of Education

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